REMARKS

In order to expedite the prosecution of the present application, the subject matter of Claim 2 has been incorporated into Claim 1. Accordingly, Claim 2 has been canceled. Additionally, Claim 1 has been amended to state that the method involves continuous extrusion. Support for this amendment can be found on original specification page 11, lines 4-8. Newly presented Claims 8-10 are directed to preferred embodiments of the present invention. No new matter has been added.

Claims 1, 4 and 7 have been rejected under 35 USC 103(a) as being unpatentable over JP '353 in view of JP '255 or JP '329. Claims 2, 5 and 6 have been rejected under 35 USC 103(a) as being unpatentable over JP '353 in view of JP '255. Applicants respectfully traverse these grounds of rejection and urge reconsideration in light of the following comments.

The presently claimed invention is directed to a method of manufacturing a high-strength aluminum alloy extruded product which excels in corrosion and stress corrosion cracking resistance. The method comprises a step of continuously extruding a billet of an aluminum alloy comprising, in weight percent, 0.5-1.5% of silicon, 0.9-1.6% of magnesium, 1.7-2.5% of copper, while satisfying specified relationships among the metals, and further comprising 0.5-1.2% of manganese, with the balance being aluminum and unavoidable impurities, into a solid product by using a solid die having a bearing length of 0.5 or more and the bearing length and thickness of the solid product to be extruded have the relationship of the bearing length being $\leq$ 5 times the thickness of the solid product to be extruded, to obtain the solid product in which a fiber structure accounts for 60% or more in area-fraction of the cross-sectional structure of the solid product. A flow guide is provided in front of the solid die, an inner circumferential surface of the guide hole of the flow die is separated from an outer circumferential surface of

an orifice which is continuous with the bearing of the solid die at a distance of 9-15 mm, and the thickness of the flow guide is 5-25% of the diameter of the billet.

As explained in the previous Responses, the present invention allows the production of a high-strength aluminum alloy extruded product having a fibrous structure accounting for at least 60% in area-fraction of the cross-sectional structure of the product which gives the product superior mechanical properties. In the present invention, it is required to have the claimed composition of the materials used to form the extruded product and the dimensions of the die, as well as various parts of flow guides, applicable when a product is extruded using a die alone or using a die together with a flow guide attached thereto, in order to obtain the superior extruded product of the present invention. It is respectfully submitted that the prior art cited by the Examiner does not disclose the presently claimed invention.

JP '353 is directed to a process for increasing the strength of a worked product in which an ingot of an aluminum-copper alloy containing specified weight percentages of copper, manganese, magnesium and silica is subjected to specified treatment steps comprising the heating of the ingot to a specified temperature range at a specified rate of temperature increase, holding the ingot at this temperature for a specified time period, heating the ingot to another specified temperature range, holding the ingot at this temperature for a specified time period and then cooling the ingot to a specified temperature at a specified cooling rate. This reference discloses that these process steps inhibit the extinction of the fiber structure attendant on the progress of recrystallization after aging treatment or an expanded aluminum-copper base aluminum alloy material.

In the final rejection, the Examiner has stated that JP '353 teaches the extrusion of an aluminum alloy having alloying ranges of silicon, magnesium, copper and manganese that substantially overlaps the alloy composition in Claim 1

and 4 of the present application as well as equations 1-4. However, JP '353 does not disclose a specific alloy composition falling within the scope of the present claims nor does it disclose the specific apparatus limitations required by the present claims. Additionally, the alloy composition required by newly presented claims 10 and 11 exclude the critical iron or titanium and boron components required in this reference.

JP '255 discloses the production of a member for an automobile brake prepared from an aluminum alloy having a composition containing specified amounts of silicon, magnesium, copper, iron, manganese, chromium and the balance being aluminum with inevitable impurities. As with the previously discussed reference, this reference clearly discloses an alloy composition outside of the scope of newly presented Claims 10 and 11. The Examiner states that this reference discloses that the bearing length of a solid die is approximately equal to the thickness of the extruded material and given the disclosure of this reference, it would have been obvious to select a suitable bearing length to provide an extruded material with a thickness with satisfactory strength and no cracking. However, the presently claimed invention is based on the unobvious combination of the specified alloy having the specified alloy content being continuously extruded from a die having specified apparatus limitations. Therefore, JP '353 in combination with JP '255 does not disclose the presently claimed invention.

JP '329 discloses a die for the extrusion of an aluminum alloy which manufactures extruded shapes, such as bends and corrugations, without defects through a process involving averaging the metal flow-out speed on the outlet side of the die, even when the shapes have a large thickness difference and are wide. The Examiner cited this reference as disclosing the extrusion of similar alloys under similar extrusion apparatus parameters, including the thickness of the product and bearing length of a solid die. Once again, Applicants

point out that the alloy composition required by newly presented Claims 10 and 11 is compositionally unobvious over the disclosure of JP '329. Additionally, as pointed out previously, the teachings in this reference cannot be extended to the presently claimed invention. In the present invention, A is restricted from 9-15 mm. If the distance A is too small, the degree of working inside of the guide 05 becomes excessively high and causes recrystallization to occur in the surface of the extruded product and the higher strength required by the present invention cannot be obtained as shown in the comparison between specimen numbers 35 and 36. Moreover, as pointed out above, the alloy shown in this reference is different from that of the present invention and there is no disclosure in this reference regarding extruding an aluminum-magnesium-silicon-copper alloy having an increased copper content of from 1.7-2.5% as is required by the present invention. Therefore, JP '353 in combination with either of JP '255 or JP '353 does not present a showing of prima facie obviousness under 35 USC 103(a) with respect to the presently claimed invention.

As pointed out in the previous Response, the Declaration Under 37 CFR 1.132 of record in the present application establishes the patentability of the presently claimed invention. In the Declaration, an aluminum alloy having a composition falling within the scope of the present claims was cast semicontinuously to prepare billets having a diameter of 100 mm. The solid die used in the extrusion had a bearing length of 6 mm and the corners of the orifice were rounded off with a radius of 0.1 mm. A flow guide attached to the die had a rectangular guide hole with a distance (A) from the inner circumferential surface of the guide hole to the outer circumferential surface of the orifice set at 4 mm, 5 mm, 9 mm, 12 mm, 15 mm and 17 mm, respectively, and the thickness (B) of the flow guide set at 15 mm with respect to the billet diameter of 100 mm, with B = 15% of the billet diameter. The test results are shown in Table 2 in the Declaration.

Specimen 1 was extruded using the flow guide with a distance A of 4 mm. As a result, the aluminum alloy billet was extruded under an excessively high temperature which lead to recrystallization in the surface layer and prevented material from obtaining satisfactory strength. Due to cracks developing in the extruded product, the inner granular corrosion test and stress corrosion cracking tests could not be performed. Specimens 2-5 were extruded using flow guides within the scope of the present claims and, as a result, produced extruded products having a fiber structure of at least 60% in area fraction of the cross-sectional structure of the product, yielding a good strength, corrosion resistance and stretch corrosion cracking resistance of the extruded product. However, with respect to Specimen 6 with a flow guide having A = 17 mm, when a successive billet was supplemented to a formal billet for continuous extrusion, the end of the formal billet was cut and easy to deform. Therefore, when the successive billet was supplemented to the end of the formal billet and was extruded, air tended to be captured where the two billets were joined, which lead to an increase in inferior parts of the product and decrease in yield rate. As such, the importance of A being from 9-15 mm is established by these results.

With respect to Claim 6, none of the references disclose the extrusion of a hollow product, let alone a hollow product having a fiber structure accounting for at least 60% in area-fraction of the cross-sectional structure of the hollow product. As the Examiner is well aware, the difference between a round bar and a bar having a hollow section involves completely different extrusion operations and nothing in JP '353 suggests to one of ordinary skill in the art how to obtain an extruded product having a hollow section, let alone one having the mechanical properties associated with the presently claimed invention.

Reconsideration of the present application and the passing of it to issue is respectfully solicited.

Respectfully submitted,

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